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A suctorean parasite of *Penaeus monodon* larvae

By

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A new disease caused by a suctorean has been observed in tank-spawned and reared *Penaeus monodon* larvae. Identification of the etiologic agent pointed to *Ephelota gemmipara* R. Hertwig, a species commonly found to inhabit hydroid colonies.

Microscopy revealed a stalked body with two types of tentacles: the sucking and the piercing kinds (Fig. 1). It was observed to reproduce by multiple exogenous budding. This proceeds with the formation from the macronucleus of more than two dozen small buds arranged in a circle on top of the head. Division of the mother macronucleus gives rise to macronuclei, which are eventually delineated into ciliated individuals. These are released within seconds of each other. The other known mode of reproduction, anisogamous conjugation, has yet to be observed in this specimen.

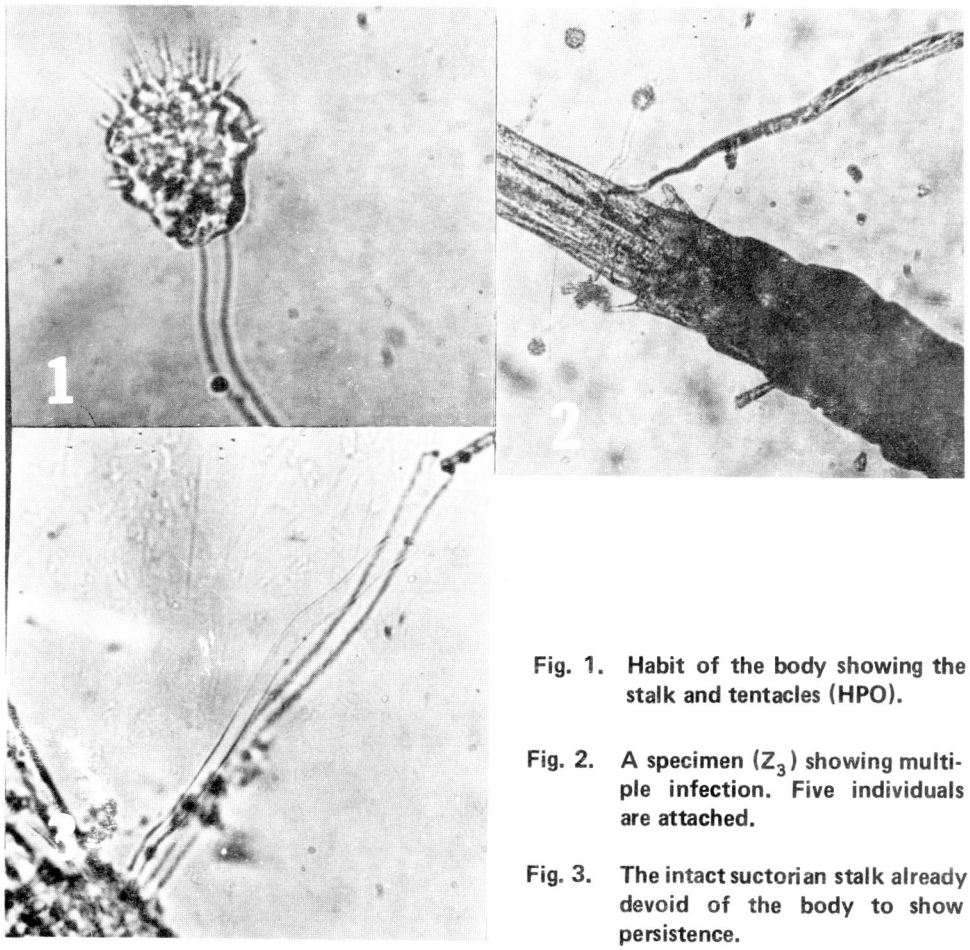

Fig. 1. Habit of the body showing the stalk and tentacles (HPO).

Fig. 2. A specimen (Z_3) showing multiple infection. Five individuals are attached.

Fig. 3. The intact suctorian stalk already devoid of the body to show persistence.

The protozoan was first detected in a production of *P. monodon* mysis reared in a concrete 50-ton tank on February 9, 1976. As of June 6, the last day of observation, a total of 15 hatchery runs were affected. The appearance of the pathogen came in streaks lasting 2 to 9 days between intervals of 4 to 25 days.

One of the runs was so severely hit that the experiment was halted, and the larval population completely discarded (H_{144}). All the other runs, except one, did not reach the harvest stage (P_{10}) owning to high mortality caused by *Lagenidium,* a fungus, and *Vorticella,* a peritrichous ciliate.

Regular microscopic examination of 50 larvae from each run revealed that the larvae are more susceptible to infection during the last zoeal stage (Z_3) as shown in Table 1. The earliest that the infection appeared, and the signs evident, was during the Z_2 stage. (See H_{145}.) The chances of infection developing for the first time during the mysis and postlarval stages are low.

Table 1. Record of hatchery runs of *Penaeus monodon* larvae affected by *Ephelota gemmipara* R. Hertwig

Expt'l Run No.	Tank Used	Date	Stage	Incidence	Larval Population	Remarks on Experimental Run
H_{122}	CT11	2-9	M_1M_2	2	334×10^3	
		2-10	M_2M_3	18	301×10^3	
						10×10^3 larvae harvested February 20 at P_{10}
H_{127}	CT3	2-25	Z_3	4	800×10^3	
		2-26	M	2	745×10^3	
						Heavy *Vorticella* load (28%) March 3; discarded March 6 at P_6
H_{128}	CT 7	2-27	Z_3	2	430×10^3	
						Discarded at P_2
H_{140}	CT 16	3-22	Z_3M_1	8	900×10^3	
		3-23	M_1	2	897×10^3	
		3-24	M_2	–	––	
		3-25	M_3	2	––	
		3-26	P_1	–	––	
		3-27	P_2	6	––	
		3-28	P_3	2	––	
		3-29	P_4	4	––	
						Fungal infection observed March 23 at M_1; no record of harvest

H_{141}	CT 5	3-25	M_4	4	600×10^3	
		3-26	M_2	—	—	
		3-27	M_3P_1	—	—	
		3-28	$M\ P_2$	—	—	
		3-29	P_3	2	—	
						No record of harvest
$H_{(?)}$	CT 14	3-31	P_1	6	—	No record of harvest; Fungal infection observed March 31 at P_1
H_{144}	CT 16	4-5	Z_3	26	—	
		4-6	Z_3M_1	14	860×10^3	
		4-7	M_2	8	—	Discarded April 8 at M_3 due to *Ephelota gemmipara*
H_{145}	CT 13	4-8	Z_2	4	$1,000 \times 10^3$	
		4-9	—	—	—	
		4-10	Z_3	2	—	Fungal infection detected April 10; discarded April 11 at M_1
$H_{(?)}$	CT 15	4-11	Z_3	12	—	
		4-12	Z_3M_1	4	—	Fungal infection April 11; no record of harvest
$H_{(?)}$	CT 14	4-16	Z_3M_1	2	—	
		4-18	M_1	20	—	Fungal infection detected April 16; No record of harvest
H_{157}	CT 14	5-4	Z_3	4	—	Fungal infection
		5-5	Z_3	4	$3,195 \times 10^3$	detected May 7;
		5-6	M_1	6	$2,600 \times 10^3$	discarded May 12
		5-7	M_2	2	$2,490 \times 10^3$	at P_3
		5-8	M_3	4	$2,000 \times 10^3$	

H_{159}	CT 9	5-8	Z_3M_1	2	458×10^3	Fungal infection detected May 8; discarded May 12 at P_1
$H_{(?)}$	CT 13	5-8	M_3	2	—	Fungal infection detected May 8; discarded same day
H_{171}	CT 14	6-4	Z_3	2	$2,233 \times 10^3$	Heavy *Vorticella* load detected June 4; discarded
H_{171}	CT 14	6-4 6-5 6-7	Z_3 M_1 M_3	2 2 6	$2,233 \times 10^3$	Heavy *Vorticella* load detected June 4; discarded June 11 at P_2 due to *Vorticella*
$H_{(?)}$	CT 15	6-6	Z_3M_1	2	$1,407 \times 10^3$	Discarded June 11 at P_2 due to *Vorticella*

Table 2. Comparison of *Ephelota* infection loads among three stages of *P. monodon*

Stage	No. of specimens infected	No. of *Ephelota* attached	Infection load/ specimen
Zoea	55	95	1.73
Mysis	35	58	1.66
Postlarva	10	10	1.00
Total	100		

Daily monitoring of the incidence showed that infection ranged from 2% to 26% of the population. Frequent changes of the culture water to reduce mortality prevented the establishment of clear-cut trends in population dynamics. However, the level of infection from day to day in each tank population is available. (See column on "Incidence.")

Of the first 100 infected specimens examined as to infection load and attachment sites, 55 were in the zoeal stages. (Table 2). These harbored a total of 95 *Ephelota* bodies for a mean infection load of 1.73 per host. Each host had at least one *Ephelota* while the three with the heaviest infection had a total of 11 each. Thirty-five hosts in the mysis stage were parasitized by a total of 58 for a mean load of 1.66. In the postlarval stage no case of multiple attachment was found, thus there was only a mean infection load of 1.00.

With regard to the infection site, there was a preponderance of attachment to broad and relatively immobile parts such as the body segments, carapace and uropods in both zoea and mysis (see Fig. 2 and Table 3). Fifty-nine of the 95 *Ephelota* in the zoeal stages were found to have attached to the 6th segment. Twenty were observed in the tail regions with the telson having 13 and the uropods, 7. In the mysis, there was a marked increase in frequency of attachment to such surface/body parts as the rostrum and eyes (6 out of 58), carapace (7 out of 58); telson and uropods (6 and 5, respectively, out of 58) in addition to the abdominal segments.

During the early stages of infection, the hosts were seen to be "normally" active. From closer analyses, their activity consisted of constant violent kicks. Probably done to shake off the pathogens, this sapped much of their energy, so that they became listless and lethargic. Feeding activity, if ever, was minimum. The attachment of the pathogen to the body was very persistent, so that the stalk, already devoid of the tentacles and cytoplasmic contents, remained attached even after repeated molts and further metamorphosis (Fig. 3).

What makes *Ephelota* a cumbersome pathogen aside from such irritating actions is the combined sucking and piercing by the two kinds of tentacles. Weakening of the host by repeated brushes on the irritable surfaces is followed by the extraction of liquids from the cytoplasm. The extracted material is formed into a food vacuole in the suctorean after a brief but rapid flow through the stalk. Another factor that favors the pathogen is its ability to reproduce fast by multiple exogenous budding. A number of ciliated gemmules result with each liberation. Each is capable of growing into a new individual.

Table 3. Distribution of *Ephelota* on the various body parts of *P. monodon*

Body Parts	STAGES		
	Zoea	Mysis	Postlarva
Body segments			
1st	2	0	0
2nd	3	5	1
3rd	4	2	0
4th	4	2	1
5th	4	4	0
6th	42	11	1
Antennae	6	1	0
Antennules	1	1	2
Rostrum	1	6	0
Eyes	2	6	0
Carapace	5	7	1
Gills	1	1	0
Telson	13	6	1
Uropods	7	5	1
Pleopods	–	1	1
Pereiopods	–	–	1
Total	95	58	10

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